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EMISSION RESULTS FROM A TEXACO CATALYST CONCEPT APPLIED TO A PREVIOUSLY UNCONTROLLED ENGINE

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Ann Arbor, Michigan

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15. Supplementary Notes

16. Abstracts

The vehicle tested in this study was a 1967 Pontiac Tempest station wagon with an overhead cam six cylinder engine. The engine was modified to provide internal exhaust gas recirculation. An air pump and a catalytic reactor were also added for further emission reductions. A special Texaco design ignition system was provided to allow operation at leaner fuel air ratios and to provide more energy for spark propagation. A complete series of hot and cold emission tests were run using these test cycles: (1) 1970 Federal Emission Test Procedure; (2) 1972 Federal Emission Test Procedure; (3) a combination using 9 repeats of the 1970 driving cycle. It was concluded that the vehicle, as tested, did not meet the requirements of 1975 or 1976 emission standards. The results of the hot start tests indicate that better control over the choke and warm up, 1975 emissions could be met. The prospect of this vehicle meeting 1976 standards seem slight without further NOX control.

17. Key Words and Document Analysis. 17a. Descriptors

Air pollution
Exhaust emissions
Automobiles
Catalytic converters
Tests
Standards
Nitrogen oxides
Hydrocarbons
Carbon monoxide
Carbon dioxide

17b. Identifiers/Open-Ended Terms

Texaco Catalytic Ignition System
Federal Test Procedure (1970)
Federal Test Procedure (1972)
Hot start
Cold start

17c. COSATI Field/Group 13B

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Vehicle Tested

For this test a 1967 Pontiac Tempest station wagon with an overhead cam six cylinder engine was used. The engine was modified to provide internal exhaust gas recirculation through camshaft changes. In addition, an air pump and a catalytic reactor were added to provide further exhaust emission reductions. An inertia weight of 3500 pounds and equivalent horsepower settings were used.

A special Texaco design ignition system was provided to allow operation at leaner fuel air ratios and to provide more energy for spark propagation.

Test Procedures

In order to evaluate the emission performance on the vehicle tested, a complete series of emission tests, both hot and cold were run. The test cycles used were as follows:

1. 1970 Federal Emission Test Procedure (FTP)
2. 1972 Federal Emission Test Procedure (LA 4)
3. A combination, using nine (9) repeats of the 1970 driving cycle with the 1972 mass sampling technique (9 x 7)

Both hot and cold start tests were run to compare the cold portion contribution and the contribution due to the cold start.

For the 1970 test procedure a non-dispersive infrared technique was used for NO analysis in addition to the instrumentation specified in the Federal Register.

For the 1972 test procedure NO_x measurements were made using both the chemilumeniscent technique and a modified Saltzman method. Both measurements were corrected for humidity using the formula published in the February 27, 1971, Federal Register.

Emission Results

The results of these tests are reported in Tables 1 and 2. In Table 1 a comparison is made between hot and cold start emissions using the 1972 Federal emission test procedure. The vehicle does not meet the 1975 standards although it easily passes the 1972-1974 levels. As can be seen from the hot and cold start comparison the majority of the hydrocarbons and carbon monoxide are produced during the cold portion of the test while NO_x is relatively unaffected by either cold or hot start.

The results shown in Table 2 indicate that the vehicle meets the 1970 emission standards easily.

Since there were no evaporative emission controls, no attempt to measure these emissions was made.

Conclusions

The vehicle, as tested, did not meet the requirements of 1975 or 1976 emission standards. The results of the hot start tests indicate that with better control over the choke and warm up, 1975 emission standards could be met. The prospect of this vehicle meeting 1976 standards seem slight without some type of further NO_x control.

Table 1

1972 Federal Emission Tests (LA 4)

Test Type	HC FID	CO IR	CO_2 IR	NO_x Saltzman	NO_x CI
Cold Start	1.2	8.6	722	1.6	1.2
Hot Start	0.1	0.7	618	1.6	1.2
Cold Start	0.7	8.0	699	1.3	1.3
Hot Start	0.1	0.8	603	1.1	1.4
Cold Start	0.8	10.8	870	1.6	1.7
Hot Start	0.1	0.7	583	1.0	1.0
1975 Standards	0.46	4.7	---	---	3.0

Table 2

1970 Federal Emission Tests (FTP)
and Composite Tests (9 x 7)

Test Type	HC FID or IR	CO IR	CO_2 IR	NO IR	NO_x Saltzman
FTP Cold	0.3	1.0	---	1.6	---
FTP Hot	0.1	0.1	---	1.7	---
9 x 7 Cold	1.8	4.7	641	---	1.0
9 x 7 Hot	0.1	0.4	547	---	0.9